		Doc No. QD17TL0202
		Doc. REV.: 03
.	**Quanta Display Inc.** **SPECIFICATION**	**Issue Date: 6/23/2005**
		RoHS Compliant

Specification for TFT LCD Module

Model No.
QD17TL02   Rev.:02

Approved By

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| **Quanta Display Inc.** |
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Quanta Display Inc.   QD17TL0202 Page 2 /25

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Contact and consult with a QDI sales representative for any questions about this device.

Revision History			
REV.	Date	ECN NO.	Change Content
0	2/18/2005	N/A	Preliminary Specification Initiation
1	3/31/2005	N/A	Updated Pin assignment, lamp characteristics, Interface Block diagram
2	5/03/2005	N/A	Updated Out-line Drawing
3	6/23/2005	N/A	Updated Chromaticity of RGB, EDID

1. Application

This specification applies to a color TFT-LCD module, QD17TL0202.

2. Overview

This module is a color active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor). It is composed of a color TFT-LCD panel, driver ICs, control circuit, power supply circuit and a backlight unit. Graphics and texts can be displayed on a 1440×3× 900 dots panel with 262,144 colors by using LVDS (<u>L</u>ow <u>V</u>oltage <u>D</u>ifferential <u>S</u>ignaling) to interface and supplying +3.3V DC supply voltage for TFT-LCD panel driving and supply voltage for backlight.

The TFT-LCD panel used for this module has very high aperture ratio. A low-reflection and higher-color-saturation type color filter is also used for this panel. Therefore, high-brightness and high-contrast image, which is suitable for the multimedia use, can be obtained by using this module.

Optimum viewing direction is 6 o'clock.

[Features]
1) High aperture ratio, high-brightness.
2) Brilliant and high contrast image.
3) Small footprint and thin shape.
4) WXGA resolution (900 vertical by 1440 horizontal pixel array).
5) LVDS interface.
6) RoHS compliant

3. General Specifications

Parameter	Specifications	Unit
Display size	17.0" Diagonal	in
Active area	367.2 (H)×229.5 (V)	mm
Pixel format	1440 (H)×900 (V)	Pixel
	(1 pixel = R+G+B dots)	
Pixel pitch	0.255 (H)　×　0.255 (V)	mm
Pixel configuration	R, G, B vertical stripe	
Display mode	Normally white	
Unit outline dimensions (typ.)*1	382.7 (H)×245.1 (V)×7.0 (T) Max	mm
Mass	750 typ.	g
Surface treatment	Glare + Hard Coating 3H	

[Note] : excluding backlight cables. Outline dimensions are shown in this specification.

4. Input Connectors

4-1 Signal Interface Connector

CN1 (2 channel, LVDS signals – NSC/Ti standard and +3.3V DC power supply)
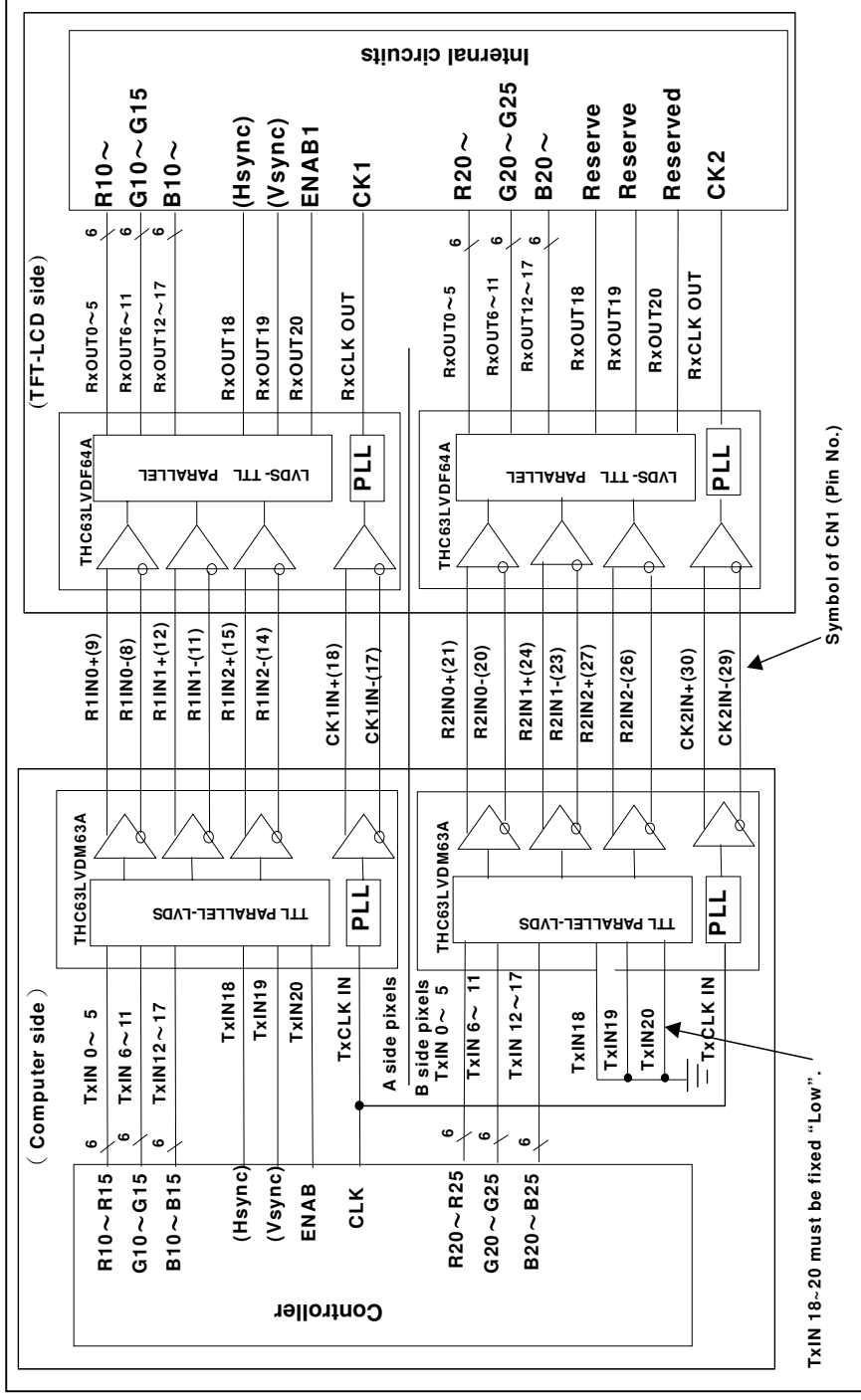Using connector: FI-XB30Sx-HFxx/FI-X30Sx-HFxx/equivalent (JAE)
Interface Cable Pin Assignments

PIN NO	SYMBOL	FUNCTION
1	VSS	Ground
2	VDD	Power Supply, 3.3 V (typical)
3	VDD	Power Supply, 3.3 V (typical)
4	V EEDID	DDC 3.3V power
5	NC	Reserved for supplier test point
6	Clk EEDID	DDC Clock
7	DATA EEDID	DDC Data
8	Rin0-	- LVDS differential data input (R0-R5, G0) (odd pixels)
9	Rin0+	+ LVDS differential data input (R0-R5, G0) (odd pixels)
10	VSS	Ground
11	Rin1-	- LVDS differential data input (G1-G5, B0-B1) (odd pixels)
12	Rin1+	+ LVDS differential data input (G1-G5, B0-B1) (odd pixels)
13	VSS	Ground
14	Rin2-	- LVDS differential data input (B2-B5, HS, VS, DE) (odd pixels)
15	Rin2+	+ LVDS differential data input (B2-B5, HS, VS, DE) (odd pixels)
16	VSS	Ground
17	ClkIN-	- LVDS differential clock input (odd pixels)
18	ClkIN+	+ LVDS differential clock input (odd pixels)
19	VSS	Ground
20	Even_Rin0-	- LVDS differential data input (R0-R5, G0) (even pixels)
21	Even_Rin0+	+ LVDS differential data input (R0-R5, G0) (even pixels)
22	VSS	Ground
23	Even_Rin1-	- LVDS differential data input (G1-G5, B0-B1) (even pixels)
24	Even_Rin1+	+ LVDS differential data input (G1-G5, B0-B1) (even pixels)
25	VSS	Ground
26	Even_Rin2-	- LVDS differential data input (B2-B5, HS, VS, DE) (even pixels)
27	Even_Rin2+	+ LVDS differential data input (B2-B5, HS, VS, DE) (even pixels)
28	VSS	Ground
29	Even _Clk in-	- LVDS differential clock input (even pixels), 2.1V
30	Even _Clk in+	+ LVDS differential clock input (even pixels), 2.1V

[Note 1] Relation between LVDS signals and actual data shows below section (4-2).

[Note 2] The shielding case is connected with signal GND.

4-2 Interface Block diagram

（Computer side）

Controller

THC63LVDM63A

TTL PARALLEL-LVDS

R10～R15
G10～G15
B10～B15

(Hsync)
(Vsync)
ENAB

CLK

TxIN 0～ 5
TxIN 6～11
TxIN12～17

TxIN18
TxIN19
TxIN20

TxCLK IN

A side pixels

6
6
6

PLL

R1IN0+(9)
R1IN0-(8)
R1IN1+(12)
R1IN1-(11)
R1IN2+(15)
R1IN2-(14)

CK1IN+(18)
CK1IN-(17)

THC63LVDM63A

TTL PARALLEL-LVDS

R20～R25
G20～G25
B20～B25

TxIN18
TxIN19
TxIN20

TxCLK IN

B side pixels
TxIN 0～ 5
TxIN 6～ 11
TxIN 12～17

6
6
6

PLL

R2IN0+(21)
R2IN0-(20)
R2IN1+(24)
R2IN1-(23)
R2IN2+(27)
R2IN2-(26)

CK2IN+(30)
CK2IN-(29)

Symbol of CN1 (Pin No.)

TxIN 18~20 must be fixed "Low".

（TFT-LCD side）

THC63LVDF64A

LVDS-TTL PARALLEL

RxOUT0～5
RxOUT6～11
RxOUT12～17

RxOUT18
RxOUT19
RxOUT20

RxCLK OUT

6
6
6

PLL

Internal circuits

R10～
G10～G15
B10～

(Hsync)
(Vsync)
ENAB1

CK1

THC63LVDF64A

LVDS-TTL PARALLEL

RxOUT0～5
RxOUT6～11
RxOUT12～17

RxOUT18
RxOUT19
RxOUT20

RxCLK OUT

6
6
6

PLL

R20～
G20～G25
B20～

Reserve
Reserve
Reserved

CK2

4-3. Backlight driving

CN2: BHSR-02VS-1 (JST)

Mating connector: SM02B-BHSS-1-TB (JST) or 87210-0200

Pin No.	Symbol	Function
1	V$_{HIGH}$	Power supply for lamp (High voltage side)
2	V$_{LOW}$	Power supply for lamp (Low voltage side)

[Note]VBLH and VBLC must be connected correctly. If user connects wrongly, the user will be hurt and module will be broken.

5. Absolute Maximum Ratings

5-1 LCD module

Parameter	Symbol	Condition	Ratings	Unit	Remark
Input voltage	V$_I$	Ta=25℃	−0.3 ～ VDD+0.3	V	[Note1]
+3.3V supply voltage	VDD	Ta=25℃	0 ～ + 4	V	
Storage temperature	Tstg	―	-25 ～+60	℃	[Note2]
Operating temperature (Ambient)	Topa	―	0～+50	℃	[Note3]

[Note1]　LVDS signals

[Note2]　Humidity : 95%RH Max. at Ta≦40℃.

　　　　　Maximum wet-bulb temperature at 39℃ or less at Ta>40℃.

　　　　　No condensation.

[Note3]　When you apply the LCD module for OA system. Please make sure to keep the temperature of LCD module is less than 60 ℃

6. Electrical Characteristics

6-1.TFT-LCD panel driving   Ta＝25℃

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
VDD	Supply voltage	VDD	+3.0	+3.3	+3.6	V	[Note2]
	Current dissipation	IDD	—	*450*	*600*	mA	[Note3]
Permissive input ripple voltage		V_{RP}	—	—	100	mV p-p	Vcc=+3.3V
Differential input Threshold voltage	High	V_{TH}	—	—	+100	mV	V_{CM}=+1.2V
	Low	V_{TL}	-100	—	—	mV	【Note1】
Terminal resistor		R_T	—	100	—	Ω	Differential input
Rush current		I_{RUSH}			1.5	A	Rise time 470uS

[Note 1] V_{CM} : Common mode voltage of LVDS driver.

[Note 2] On-off conditions for supply voltage

0.5＜t1≦10 ms
0＜t2≦50 ms
0＜t3≦50 ms
400 ms≦t4
200 ms≦t5
200 ms≦t6
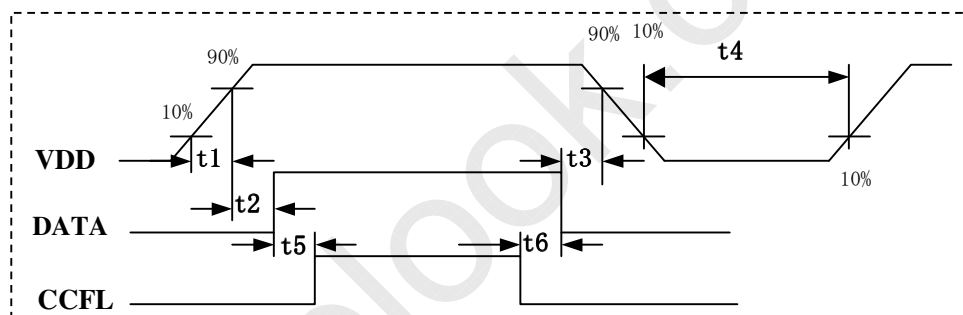
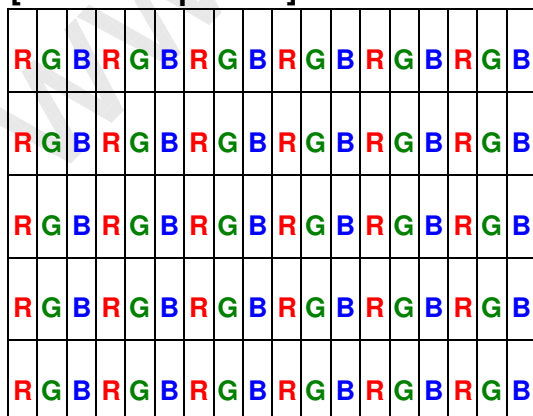**Vcc-dip conditions**
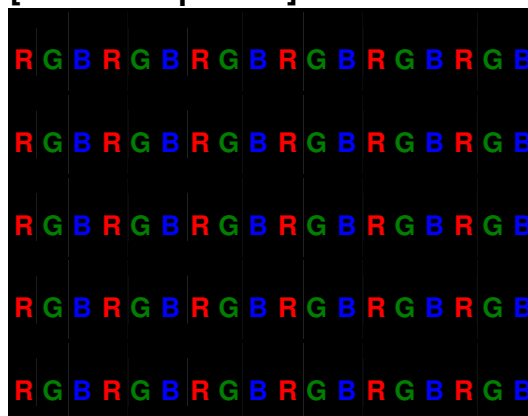
1) 2.5 V≦Vcc＜3.0 V
   td≦10 ms

2) Vcc＜2.5 V
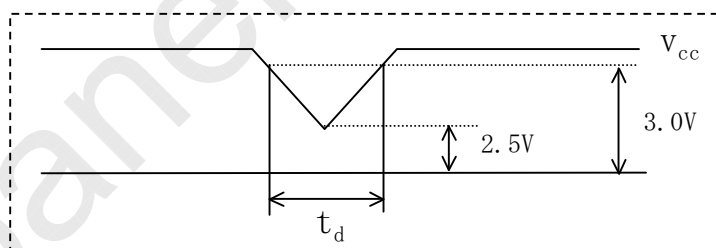
Vcc-dip conditions should also follow the On-off conditions for supply voltage

【Note3】 Test pattern of current dissipation
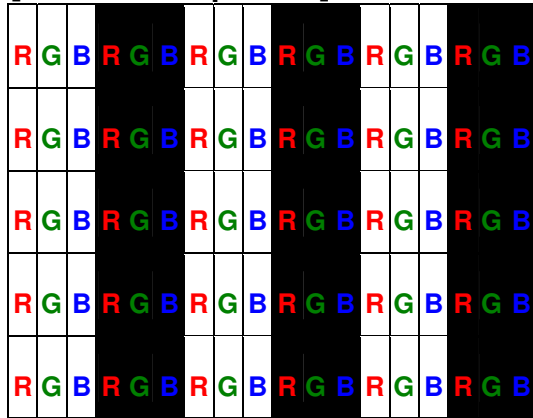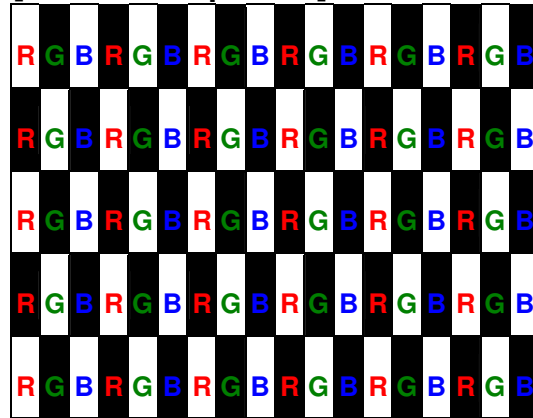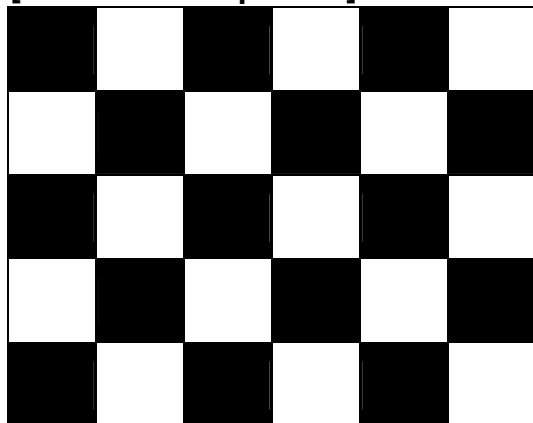
[Full white pattern]   VDD=+3.3V

[Full black pattern]   VDD=+3.3V

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[1 line on/off pattern]   **VDD=+3.3V**

[1 dot on/off pattern]   **VDD=+3.3V**


[32x32 Mosaic pattern] VDD=+3.3V

6-2. Backlight driving

The backlight system is an edge-lighting type with single CCFT (Cold Cathode Fluorescent Tube).

The characteristics of the lamp are shown in the following table.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark	
Lamp current range	I_L	3.0	6.5	—	mArms	[Note1]	
Lamp voltage	V_L	652	724	796	Vrms		
Lamp power consumption	P_L	—	4.7	—	W	$I_{L=}6.0mA$ [Note2]	
Lamp frequency	F_L	50	—	60	kHz	[Note3]	
Kick-off voltage	Vs	—	—	1330	Vrms	Ta=25℃	
		—	—	1660	Vrms	Ta=0℃	[Note4]
Lamp life time	L_L	10000	—	—	hour	[Note5]	

[Note1］ Lamp current is measured with current meter for high frequency as shown below.
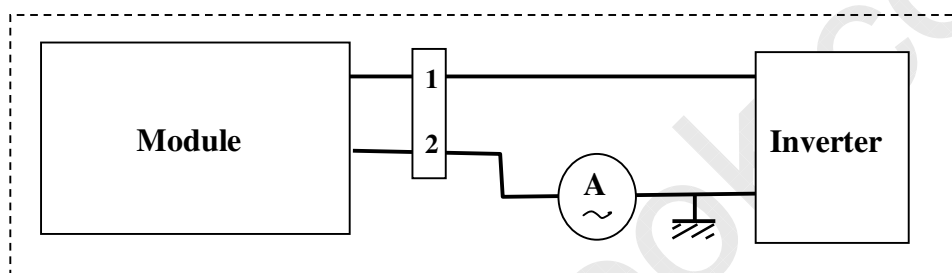
[Note2]Calculated Value for reference ($I_L \times V_L$)

[Note3]Lamp frequency may produce interference with horizontal synchronous frequency, and this may cause beat on the display. Therefore lamp frequency shall be detached as much as possible from the horizontal synchronous frequency and from the harmonics of horizontal synchronous to avoid interference.

[Note4] The voltage above this value should be applied to the lamp for more than 1 second to start-up. Otherwise the lamp may not be turned on.

[Note5] Lamp life time is defined as the time when either ① or ② occurs in the continuous operation under the condition of Ta = 25℃ and I_L = 6.0 mArms.

① Brightness becomes 50 % of the original value under standard condition.

② Kick-off voltage at Ta = 0℃ exceeds maximum value.

[Note] The performance of the backlight, for example life time or brightness, is much influenced by the characteristics of the DC-AC inverter for the lamp. When you design or order the inverter, please make sure that a poor lighting caused by the mismatch of the backlight and the inverter (miss-lighting, flicker, etc.) never occur. When you confirm it, the module should be operated in the same condition as it is installed in your instrument.

7. Timing characteristics of LCD module input signals

7-1. Timing characteristics

(This is specified at digital outputs of LVDS driver.)
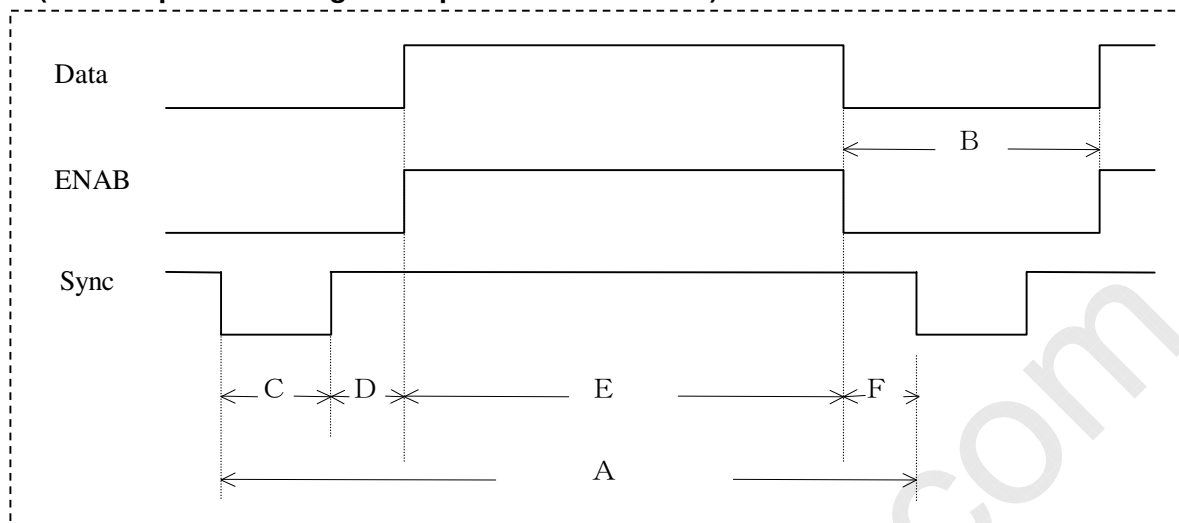
（ Vertical ）

Item （symbol）	Min.	Typ.	Max.	Unit	Remark
Vsync cycle (T_{VA})	16.71	16.68	16.70	ms	Negative
	910	912	934	line	
Blanking period(T_{VB})	10	12	34	line	
Sync pulse width (T_{VC})	3	3	6	line	
Back porch (T_{VD})	5	6	25	line	
Sync pulse width + Back porch ($T_{VC}+T_{VD}$)	8	9	31	line	
Active display area (T_{VE})	900	900	900	line	
Front porch (T_{VF})	2	3	3	line	

(Horizontal)

Item （symbol）	Min.	Typ.	Max.	Unit	Remark
Hsync cycle (T_{HA})	18.36	18.29	17.87	μ s	Negative
	1690	1760	1904	clock	
Blanking period (T_{HB})	250	320	464	clock	
Sync pulse width (T_{HC})	32	32	152	clock	
Back porch (T_{HD})	188	224	232	clock	
Sync pulse width + Back porch ($T_{HC} +T_{HD}$)	220	256	384	clock	
Active display area (T_{HE})	1440	1440	1440	clock	
Front porch (T_{HF})	30	64	80	clock	

（Clock ）

Item	Min.	Typ.	Max.	Unit	Remark
Frequency	92.3	96.3	106.7	MHz	[Note1/2]

[Note1] In case of lower frequency, the deterioration of display quality, flicker etc., may be occurred.

[Note2] Two pixel-data are sampled at a same time.

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7-2. Input Data Signals and Display Position on the screen

D1, DH1	D2, DH1	D3, DH1		D1440, DH1
D1, DH2	D2, DH2		
D1, DH3			

| R | G | B |

| D1, DH900 | | | | D1440, DH900 |

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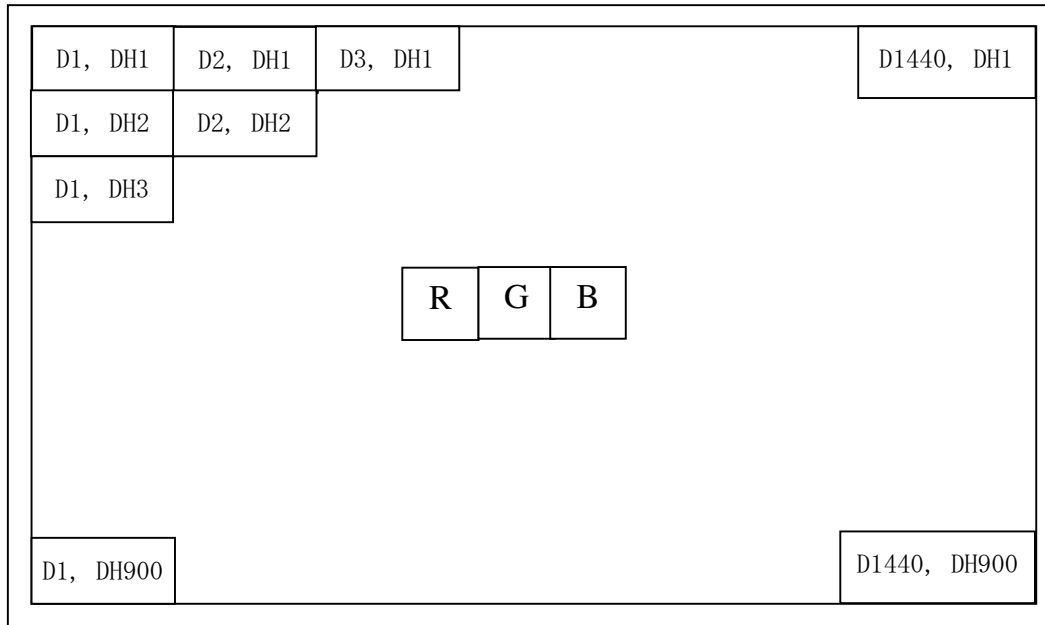
8. Input Signals, Basic Display Colors and Gray Scale of Each Color

Colors & Gray scale		Gray Scale	R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5
Basic Color	Black	—	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	—	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Green	—	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Cyan	—	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Red	—	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	—	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	—	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	—	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale of Red	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	⇩			⇩						⇩						⇩			
	⇩	⇩			⇩						⇩						⇩			
	Brighter	GS61	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	⇩	GS62	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red	GS63	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	⇧	⇩			⇩						⇩						⇩			
	⇩	⇩			⇩						⇩						⇩			
	Brighter	GS61	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0
	⇩	GS62	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0
	Green	GS63	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale of Blue	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	⇧	⇩			⇩						⇩						⇩			
	⇩	⇩			⇩						⇩						⇩			
	Brighter	GS61	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1
	⇩	GS62	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	Blue	GS63	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

0 : Low level voltage, 1 : High level voltage

Each basic color can be displayed in 64 gray scales from 6 bit data signals. According to the combination of total 18 bit data signals, the 262,144-color display can be achieved on the screen.

9. EDID data structure

This is the EDID (Extended Display Identification Data) data format to support displays as defined in the VESA Plug & Display.

Byte (decimal)	Byte (hex)	Field Name and Comments	Value (hex)	Value (binary)
Header				
0	0	Header	00	00000000
1	1	Header	FF	11111111
2	2	Header	FF	11111111
3	3	Header	FF	11111111
4	4	Header	FF	11111111
5	5	Header	FF	11111111
6	6	Header	FF	11111111
7	7	Header	00	00000000
Vender/Product ID / EDID Version				
8	8	EISA manufacturer code=QDS	44	01000100
9	9	EISA manufacturer code(Compressed ASCII)	93	10010011
10	0A	Product code (47) LSB	2F	00101111
11	0B	Product code MSB	00	00000000
12	0C	ID (32bit) Serial No (zero if not used)	00	00000000
13	0D	ID (32bit) Serial No (zero if not used)	00	00000000
14	0E	ID (32bit) Serial No (zero if not used)	00	00000000
15	0F	ID (32bit) Serial No (zero if not used)	00	00000000
16	10	Week of manufacture	00	00000000
17	11	Year of manufacture – 1990 (ex. 2005-1990=15)	0F	00001111
18	12	EDID structure version # = 1	01	00000001
19	13	EDID revision # = 3	03	00000011
Display Parameter				
20	14	Video I/P definition = Digital I/P	80	10000000
21	15	Max H image size (cm) =37cm	25	00100101
22	16	Max V image size (cm) =23cm	17	00010111
23	17	Display gamma (2.2×100) –100	78	01111000
24	18	Features (no DPMS,Active off,RGB,timing BLK1)	0A	00001010
Panel Color Coordinates				
25	19	Red/Green Low bits (RxRy/GxGy)	4D	01001101
26	1A	Blue/White Low bits (BxBy/WxWy)	70	01110000
27	1B	Red X Rx=0.595	98	10011000
28	1C	Red Y Ry=0.34	57	01010111
29	1D	Green X Gx=0.3	4C	01001100
30	1E	Green Y Gy=0.548	8C	10001100

31	1F	Blue X Bx=0.162	29	00101001
32	20	Blue Y By=0.148	25	00100101
33	21	White X Wx=0.313	50	01010000
34	22	White Y Wy=0.329	54	01010100

Established Timings

| 35 | 23 | Established timings 1 (00h if not used) | 00 | 00000000 |
| 36 | 24 | Established timings 2 (00h if not used) | 00 | 00000000 |

Standard Timing ID

37	25	Manufacturer's timings(00h if not used)	00	00000000
38	26	Standard timing ID1 (01h if not used)	01	00000001
39	27	Standard timing ID1 (01h if not used)	01	00000001
40	28	Standard timing ID2 (01h if not used)	01	00000001
41	29	Standard timing ID2 (01h if not used)	01	00000001
42	2A	Standard timing ID3 (01h if not used)	01	00000001
43	2B	Standard timing ID3 (01h if not used)	01	00000001
44	2C	Standard timing ID4 (01h if not used)	01	00000001
45	2D	Standard timing ID4 (01h if not used)	01	00000001
46	2E	Standard timing ID5 (01h if not used)	01	00000001
47	2F	Standard timing ID5 (01h if not used)	01	00000001
48	30	Standard timing ID6 (01h if not used)	01	00000001
49	31	Standard timing ID6 (01h if not used)	01	00000001
50	32	Standard timing ID7 (01h if not used)	01	00000001
51	33	Standard timing ID7 (01h if not used)	01	00000001
52	34	Standard timing ID8 (01h if not used)	01	00000001
53	35	Standard timing ID8 (01h if not used)	01	00000001

Timing Descriptor #1

54	36	Pixel Clock(96.3M)/10,000 (LSB)	9E	10011110
55	37	Pixel Clock(96.3M)/10,000 (MSB)	25	00100101
56	38	Horizontal Active=1440 pixels　　　　　　(lower 8 bits)	A0	10100000
57	39	Horizontal Blanking=320 pixels　　　　　(lower 8bits)	40	01000000
58	3A	Horizontal Active: Horizontal Blanking　　(upper 4:4 bits)	51	01010001
59	3B	Vertical Active =900 lines　　　　　　　(lower 8bits)	84	10000100
60	3C	Vertical Blanking=12 lines　　　　　　　(lower 8bits)	0C	00001100
61	3D	Vertical Active : Vertical Banking　　　　(upper 4:4 bits)	30	00110000
62	3E	Horizontal Sync.Offset =64 pixels　　　　(lower 8bits)	40	01000000
63	3F	Horizontal Sync.Width=32 pixels　　　　(lower 8bits)	20	00100000
64	40	Vertical Sync. Offset: lines Sync. Width　　(lower 4bits)	33	00110011
65	41	Horizontal/Vertical Sync Offset/Width　　(upper 2 bits)	00	00000000
66	42	Horizontal Image Size=367.2mm　　　　(lower 8 bits)	6F	01101111
67	43	Vertical Image Size=229.5mm　　　　　(lower 8 bits)	E6	11100110

68	44	Horizontal : Vertical Image Size (upper 4:4 bits)	10	00010000
69	45	Horizontal Border (zero for internal LCD)	00	00000000
70	46	Vertical Border (zero for internal LCD)	00	00000000
71	47	Non-interlaced,Normal,no stereo,Separate sync,H/V pol negatives	18	00011000

Timing Descriptor #2 MANUFACTURER SPECIFIED RANGE TIMING Descriptor

72	48	Flag	00	00000000
73	49	Flag	00	00000000
74	4A	Flag	00	00000000
75	4B	Data Type Tag : Descriptor Defined by Manufacturer	0F	00001111
76	4C	Flag	00	00000000
77	4D	Value=HSPW min/2 (pixel clks)	10	00010000
78	4E	Value=HSPW max/2 (pixel clks)	4C	01001100
79	4F	Value=Thbp min/2 (pixel clks)	6E	01101110
80	50	Value=Thbp max/2 (pixel clks)	C0	11000000
81	51	Value=VSPW min/2 (line pulses)	02	00000010
82	52	Value=VSPW max/2 (line pulses)	03	00000011
83	53	Value=Tvbp min/2 (line pulses)	04	00000100
84	54	Value=Tvbp max/2 (line pulses)	10	00010000
85	55	Thp min=value*2+HA pixel clks (pixel clks)	7D	01111101
86	56	Thp max=value*2+HA pixel clks (pixel clks)	E8	11101000
87	57	Tvp min=value*2+VA lines	05	00000101
88	58	Tvp max=value*2+VA lines	11	00010001
89	59	Module revision	01	00000001

Timing Descriptor #3 : ASCII String : Supplier Name

90	5A	Flag	00	00000000
91	5B	Flag	00	00000000
92	5C	Flag	00	00000000
93	5D	Data Type Tag : Module serial number	FE	11111110
94	5E	Flag	00	00000000
95	5F	ASCII (Q)	51	01010001
96	60	ASCII (U)	55	01010101
97	61	ASCII (A)	41	01000001
98	62	ASCII (N)	4E	01001110
99	63	ASCII (T)	54	01010100
100	64	ASCII (A)	41	01000001
101	65	ASCII (D)	44	01000100
102	66	ASCII (I)	49	01001001
103	67	ASCII (S)	53	01010011
104	68	ASCII (P)	50	01010000
105	69	ASCII (L)	4C	01001100

106	6A	ASCII (A)	41	01000001
107	6B	ASCII (Y)	59	01011001
Timing Descriptor #4 ASCII String : Supplier P/N				
108	6C	Flag	00	00000000
109	6D	Flag	00	00000000
110	6E	Flag	00	00000000
111	6F	Data Type Tag : Module Name	FE	11111110
112	70	Flag	00	00000000
113	71	Q	51	01010001
114	72	D	44	01000100
115	73	1	31	00110001
116	74	7	37	00110111
117	75	T	54	01010100
118	76	L	4C	01001100
119	77	0	30	00110000
120	78	2	32	00110010
121	79	Product revision (ex :2)	32	00110010
122	7A	Terminate with ASCII code 0Ah	0A	00001010
123	7B	Pad field with ASCII code 20h	20	00100000
124	7C	Pad field with ASCII code 20h	20	00100000
125	7D	Pad field with ASCII code 20h	20	00100000
126	7E	Extension flag	00	00000000
127	7F	Checksum	C0	11000000

10.Optical Characteristics

Ta=25℃, Vcc=+3.3V

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle Range	Horizontal	R, L	CR>10		65	－	Deg.	[Note1,4]
	Vertical	Up			45	－	Deg.	
		Dn			55	－	Deg.	
Contrast ratio		C R n	$\theta =0°$	300				[Note2,4]
Response Time	Rise	Tr	$\theta =0°$	－	10		ms	[Note3,4]
	Decay	Td		－	15		ms	
Chromaticity of White		Wx		0.283	0.313	0.343		[Note4]
		Wy		0.299	0.329	0.359		
Chromaticity of Red		Rx		0.565	0.595	0.625		[Note4]
		Ry		0.310	0.340	0.370		
Chromaticity of Green		Gx		0.270	0.300	0.330		[Note4]
		Gy		0.518	0.548	0.578		
Chromaticity of Blue		Bx		0.132	0.162	0.192		[Note4]
		By		0.118	0.148	0.178		
Luminance of white [Note5】		Y L 2	5 points Center	175	200	－	Cd/m^2	IL = 6.0 mArms F_L=55kHz
White Uniformity		δ W1	5 Points	－	－	1.25		[Note5]
		δ W2	13 points	－	－	1.53		

The optical characteristics shall be measured in a dark room or equivalent state with the method shown in Fig.3.

Photodetector (BM-5A: TOPCON)

Field=2°

400 mm

TFT-LCD module

LCD Panel

Center of the screen

Fig 3. Optical characteristics measurement method
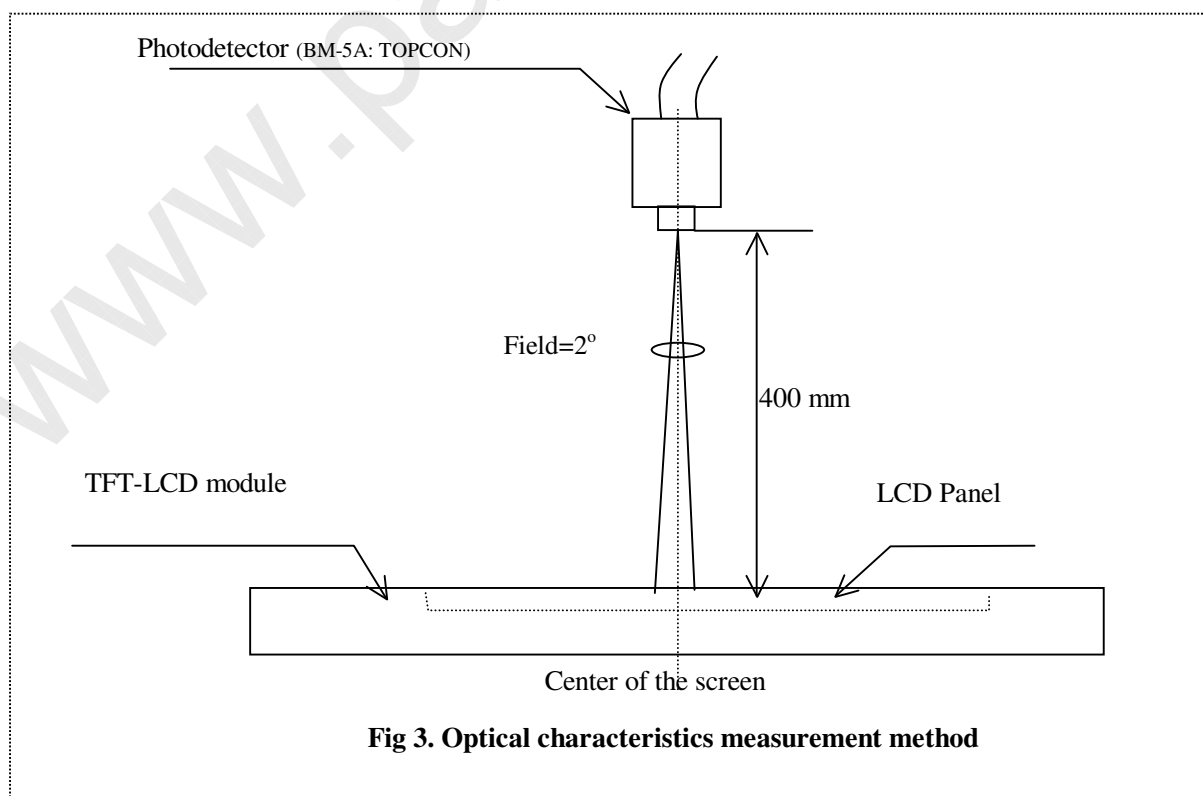
[**Note1**] **Definitions of viewing angle range:**

Normal Direction

L

**R**

Dn **Up**

6 o'clock direction
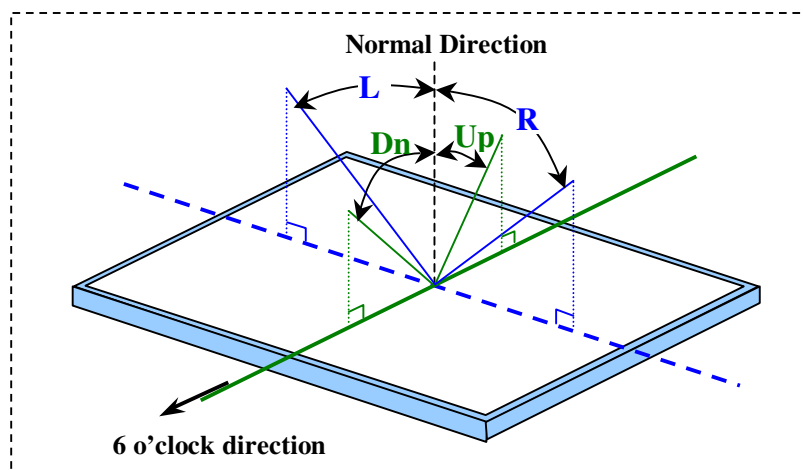
[**Note2**] **Definition of contrast ratio:**

The contrast ratio is defined as the following.

$$\text{Contrast Ratio (CR)} = \frac{\text{Luminance (brightness) with all pixels white}}{\text{Luminance (brightness) with all pixels black}}$$

[**Note3**] **Definition of response time:**

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white" .
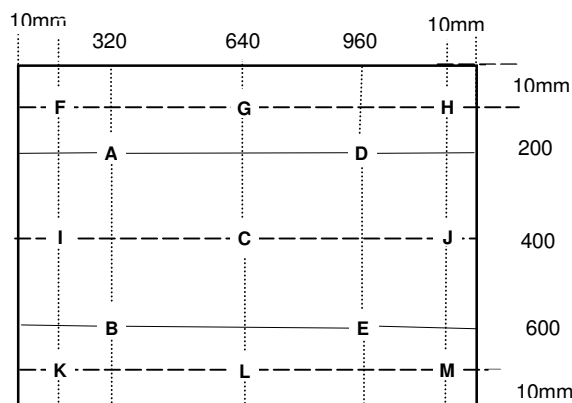
White   **Black**   **White**

Photodetector Output (Relative Value)

100%
90%

10%
0%

τ r τ d

Time
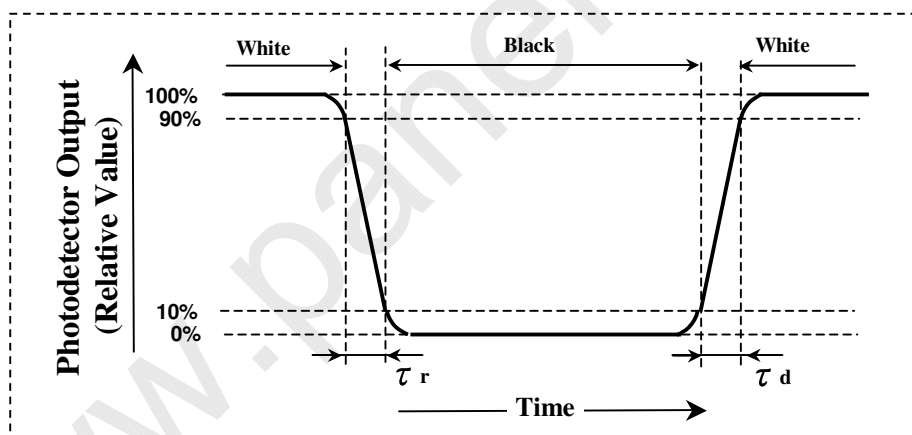
[**Note4**] **This shall be measured at center of the screen.**

[**Note5**] **Definition of white uniformity:**

$$\delta w = \frac{\text{Maximun Luminance of 5/13 points}}{\text{Minimum Luminance of 5/13 points}}$$

*1) 5 Points are A~E

*1) 13 Points are A~M

10mm   320   640   960   10mm

10mm

F   G   H

A   D   200

I   C   J   400

B   E   600

K   L   M

10mm

11. Display Quality

The display quality of the color TFT-LCD module shall be in compliance with the Incoming Inspection Standard.

12. Handling Precautions

a) Be sure to turn off the power supply when inserting or disconnecting the cable.

b) Be sure to design the cabinet so that the module can be installed without any extra stress such as warp or twist.

c) Since the front polarizer is easily damaged, pay attention not to scratch it.

d) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.

e) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.

f) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface. Handle with care.

g) Since CMOS LSI is used in this module, take care of static electricity and injure the human earth when handling.

h) Observe all other precautionary requirements in handling components.

i) This module has its circuitry PCBs on the rear side and should be handled carefully in order not to be stressed.

j) Laminated film is attached to the module surface to prevent it from being scratched. Peel the film off slowly just before the use with strict attention to electrostatic charges. Ionized air shall be blown over during the action. Blow off the 'dust' on the polarizer by using an ionized nitrogen gun, etc..

k) Cold cathode fluorescent lamp in LCD panel contains a small amount of mercurcy, please follow local ordinance or regulation for disposal.
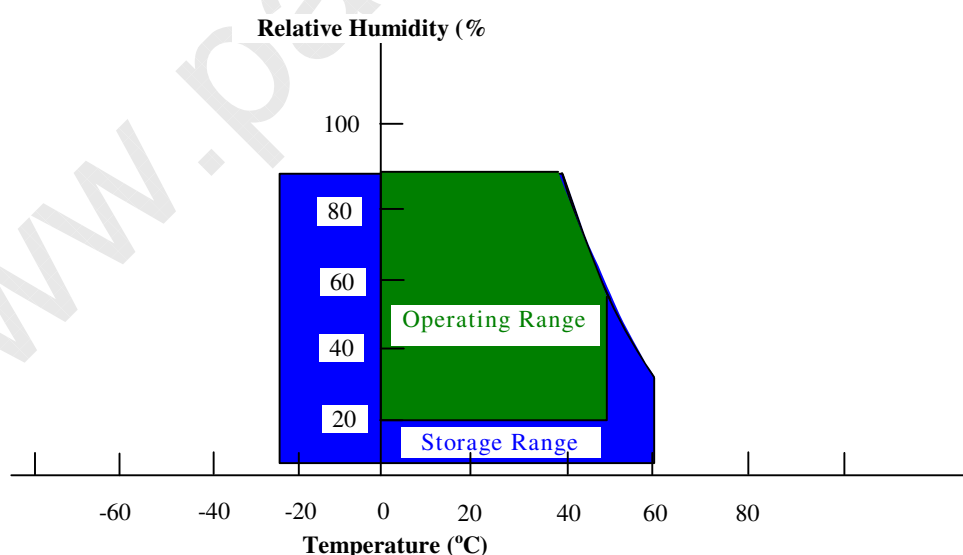
l) Mounting screw hole can stand torque 1.3~1.5 Kgf-cm.

13. Reliability test items

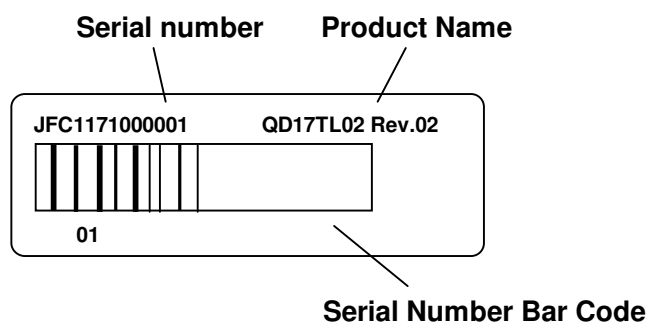| No.	Test item	Conditions
1	High temperature storage test	Ta = 60 ℃ 240h
2	Low temperature storage test	Ta = -25 ℃ 240h
3	High temperature & High humidity operation test	Ta = 40 ℃; 90%RH 240h, (As remark #3) (No condensation)
4	High temperature operation test	Ta = 50 ℃ 240h (The panel temp. must be less than 60 ℃)
5	Low temperature operation test	Ta = 0 ℃ 240h
6	Vibration test (non - operating)	Frequency : 10 ∼ 500 Hz, 1.5Grms Test period: 3hrs (1Hr for each of X, Y, Z)
7	Shock test (Non- operating)	Max. Gravity: 220G Pulse width: 2 ms, Half sine wave Direction: ±X,±Y,±Z; Once for each direction.
8	Altitude test (Operating)	0-10000 feet (3048m) / -20 ℃/ +60 ℃ / 24hr
9	Altitude test (Storage)	0-40000 feet (12192m) / 0 ℃/ +55 ℃ / 24hr

Remark:
  (1) A failure is defined as the appearance of pixel failured on any color layer or the appearance of horizontal or vertical lines, bars etc.
  (2) Low temperature storage " Panel must return to operating temperature range prior to activation."
  (3) Hi temperature / Humidity test
  Max. wet-bulb temperature is less than 39°C ; At glass temperature high than 40°C.
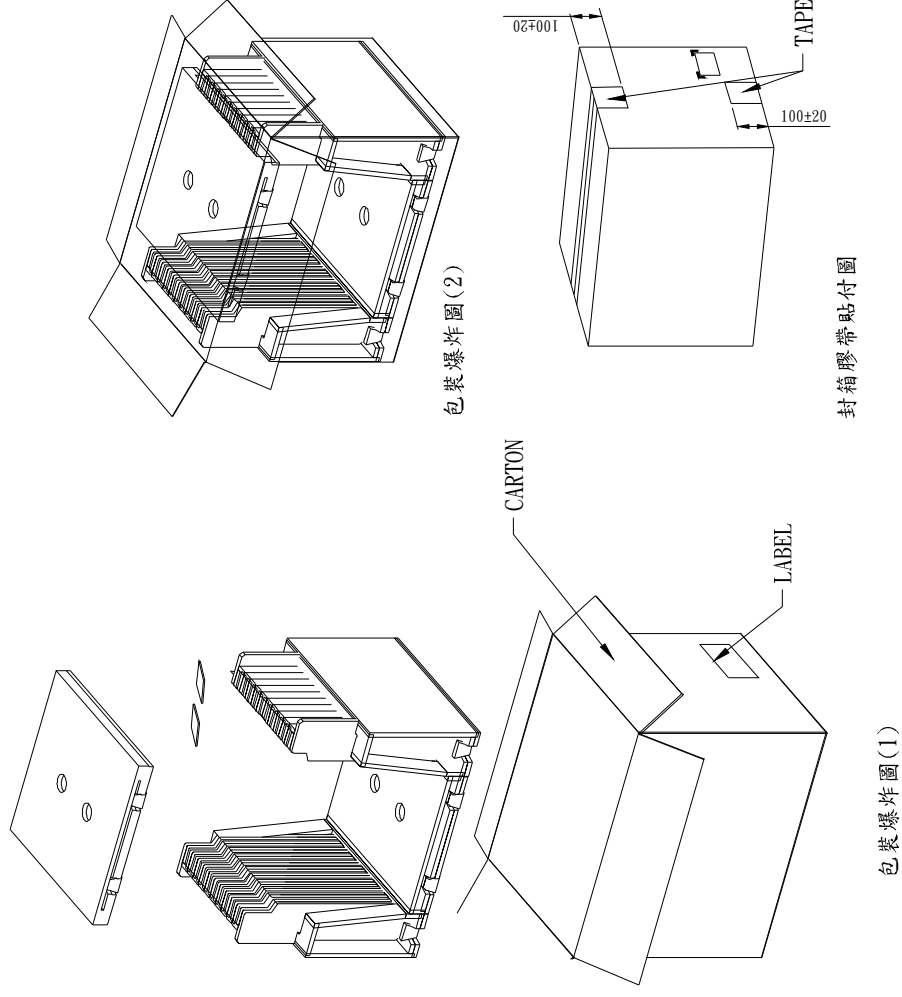 Temperature and relative humidity range is shown in the figure below.

Relative Humidity (%

100 —

80
60
40
20

Operating Range

Storage Range

-60   -40   -20   0   20   40   60   80

Temperature (^{o}C)

14. Others

1) Lot No. Label:

Serial number   Product Name

JFC1171000001   QD17TL02 Rev.02

01

Serial Number Bar Code

2) **Adjusting volume has been set optimally before shipment, so do not change any adjusted value. If adjusted value is changed, the specification may not be satisfied.**

3) **Disassembling the module can cause permanent damage and should be strictly avoided.**

4) **Please be careful since image retention may occur when a fixed pattern is displayed for a long time.**

5) **If any problem occurs in relation to the description of this specification, it shall be resolved through discussion with spirit of cooperation.**

15. Packing form

包裝爆炸圖 (2)

封箱膠帶貼付圖

100±20

TAPE

100±20

CARTON

LABEL

包裝爆炸圖 (1)

Quanta Display Inc.

16. Mechanical Outline Dimension

M2(8X) MOUNTING HOLES
SCREW PENETRATION DEPTH 2.5mm MAX,
TORQUE RANGE : 1.8 Kgf-cm (MAX)
　　　　　　　　 1.0 Kgf-cm (MIN)

NOTES:
1. THE TOLERANCE IS ±0.5mm IF NOT SPECIFIED.
2. BLIGOUITY TOLERANCE OF DISPLAY AREA SHOWN AS RIGHT:
   X-DIRECTION: |A-B| <=1.0mm
   Y-DIRECTION: |C-D| <=1.0mm

ACTIVE AREA CENTER

BEZEL / DISPLAY POSITION

25　QD17TL0202 Page　/25

NOTE:
1. CN1: THE INTERFACE CONNECTOR IS JAE-FI-XB30SL-HF10.
2. CN2: THE LAMP CONNECTOR IS (JST)BHSR-02VS-1(N).
3. THE TOLERANCE IS ±0.5mm IF NOT SPECIFIED.

NO.	Electrode	Remark
1	High Voltage	Pink
2	Low Voltage	White

27.3±0.5

123.3±0.5

1P

30P

CN1

120±5

30±1

CN2

BLU BARCODE LABLE

MODULE SERIAL LABLE

UL LABLE

PC+

ORIGINAL MODEL	QD17TL0202D1
MATERIAL	●
DRAWING NAME	MODULE OUTLINE(REAR)
PART NUMBER	
RELEASE LEVEL	TS	VER	S4